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PHYTOCHEMICAL STUDY, ANTIOXIDANT AND ANTI-INFLAMMATORY ACTIVITY OF THE *ANTIARIS TOXICARIA*

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Abstract

Antiaris toxicaria is a tree in the mulberry and fig family, Moraceae. It is the only species currently recognized in the genus ***Antiaris***. The genus *Antiaris* was at one time considered to consist of several species, but is now regarded as just one variable species which can be further divided into five subspecies. One significant difference within the species is that the size of the fruit decreases as one travels from Africa to Polynesia.[4] *Antiaris* has a remarkably wide distribution in tropical regions, occurring in Australia, tropical Asia, tropical Africa, Indonesia, the Philippines, Tonga, and various other tropical islands. Its seeds are spread by various birds and bats, and it is not clear how many of the populations are essentially invasive. The species is of interest as a source of wood, bark cloth, and pharmacological or toxic substances. In phytochemical analysis, sterols, tannins, anthracene, saponins, flavonoids, terpenes, phenolic nucleus, terpenes, reducing sugars, alkaloids, proteins, coumarins, saponosides were present in flowers extract of *Antiaris toxicaria*. sterols, tannins, phenolic nucleus, terpenes, reducing sugars, coumarins, saponosides were present in flowers extract of *Antiaris toxicaria*. Techniques for determining antioxidant and anti-inflammatory activities that are well-known. Both the flowers andfruitsextractof *Antiaris toxicaria*have substantial antioxidant and anti-inflammatory properties. Anti-inflammatory activity is maximum in ethanol extract for flowers and fruits extracts of *Antiaris toxicaria*.

Keywords: Antioxidant, anti-inflammatory,Fruits,flowers, Antiaris toxicaria, Phytochemicals.

Introduction

Antiaris toxicaria is a monoecious, spineless succulent shrub, typically reaching a height of about 1.5 meters. It features many branches that arise from a thick rootstock, and the branches are pencil-thin, yellowish-green, cylindrical, and smooth with alternating leaf scars. This plant thrives in dry climates, inland regions, and areas that experience colder winters. Known for its potential toxicity, *Antiaris toxicaria* is consumed only by certain animals, such as the steenbuck and klipspringer [1].

This plant contains various phytochemicals that contribute to its biological activity against diseases. Phytochemicals, including saponins, flavonoids, and terpenes, are naturally occurring

compounds that provide color, flavor, and aroma to fruits and vegetables [2]. These compounds, often referred to as phytonutrients, possess biological activity and are known for their antioxidant, anti-inflammatory, and antibacterial properties [3]. Such properties are beneficial in reducing the risk of chronic diseases by neutralizing harmful free radicals and protecting the body against oxidative stress [4].

Free radicals, which are unstable molecules generated during metabolism, can cause oxidative damage by initiating a chain reaction that harms cells. When the level of free radicals becomes excessive, it leads to oxidative stress, a condition linked to a variety of diseases, including cardiovascular issues, cancers, and diabetes. Free radicals primarily target lipids, proteins, and nucleic acids [5]. Antioxidants help counteract these effects by scavenging free radicals and preventing further cellular damage, thus maintaining a balance between antioxidants and free radicals for optimal physiological function [6].

Inflammation is a crucial protective response to infections, irritations, and injuries, manifesting as swelling, redness, heat, and pain. Chronic inflammation, which persists for extended periods, is associated with conditions such as cell death, tissue injury, ischemia, and cancer. Anti-inflammatory compounds play a key role in managing the symptoms of inflammation in the body [8].

In the present study, the presence of various phytochemicals in the flowers and fruits of *Antiaris toxicaria* was analyzed following standard protocols. Additionally, the antioxidant and anti-inflammatory activities of extracts from these plant parts were evaluated.

Figure.1. *Antiaris toxicaria*Plant

Materials and methods

Collection and Preparation of Plant Material: Flowers and fruits of *Antiaris toxicaria* were collected from Lonavala, Maharashtra. The specimens were washed with distilled water, dried, and then pulverized. The powdered material was stored in airtight containers.

The extracts obtained from the flowers and fruits were labeled asAntiaris toxicaria(flowers) and Antiaris toxicaria (fruits).

Phytochemical Screening: Phytochemical analysis was carried out using standard protocols for the detection of various bioactive compounds including sterols, tannins, anthracene, saponins, flavonoids, phenolic compounds, terpenes, alkaloids, proteins, coumarins, and saponosides.

Antioxidant Activity Determination: The DPPH (2,2-diphenyl-1-picrylhydrazyl) scavenging test was employed to assess the antioxidant potential of the extracts. Various concentrations of the extracts were tested, and the scavenging ability was compared to that of BHT (Butylated HydroxyToluene).

Anti-inflammatory Activity (In-vitro Model): The anti-inflammatory activity of the extracts was determined using the albumin denaturation method. The percentage inhibition of protein denaturation was calculated for different solvent extracts, with ibuprofen as the standard.

Results and Discussion:

Phytochemical Analysis: Phytochemical screening revealed the presence of several bioactive compounds in both the flower and fruit extracts of *Antiaris toxicaria*.

1. **EM-F (Flower Extract):** The flower extract contained sterols, tannins, anthracene, saponins, flavonoids, terpenes, phenolic nucleus, reducing sugars, alkaloids, proteins, coumarins, and saponosides.
2. **Antiaris toxicaria (Fruit Extract):** The fruit extract showed the presence of sterols, tannins, phenolic nucleus, terpenes, reducing sugars, coumarins, and saponosides.

Table 1: Phytochemical Constituents in *Antiaris toxicaria* Flower and Fruit Extracts

Phytochemical Compound	EM-F (Flowers)	Antiaris toxicaria (Fruits)
Sterols	Positive	Positive
Tannins	Positive	Positive
Anthracene	Positive	Negative
Saponins	Positive	Negative
Flavonoids	Positive	Negative
Terpenes	Positive	Negative
Phenolic Nucleus	Positive	Negative
Reducing Sugars	Positive	Positive
Alkaloids	Positive	Negative
Proteins	Positive	Negative
Coumarins	Positive	Negative

Phytochemical Compound	EM-F (Flowers)	Antiaris toxicaria (Fruits)
Saponosides	Positive	Negative

1.

Antioxidant Activity: The antioxidant activity was assessed using the DPPH scavenging method. The ethanol and chloroform extracts (C2H5OH and CHCl3) exhibited the highest antioxidant activity, with the CHCl3 extract showing better performance than CCl4 and ethanol.

Table 2: Antioxidant Activity ofAntiaris toxicaria(Flowers) Extract

Extract Conc. (mg/ml)	BHT (%)	Ethanol (%)	CHCl3 (%)	CCl4 (%)
0.05	48.1	27.3	26.93	35.8
0.1	49.91	32.77	34.53	83.79
0.2	52.24	40.66	43.54	42.32
0.3	60.57	45.12	46.5	58.6

Table 3: Antioxidant Activity of Antiaris toxicaria (Fruits) Extract

Extract Conc. (mg/ml)	BHT (%)	Ethanol (%)	CHCl3 (%)	CCl4 (%)
0.05	48.1	44.34	28.44	24.88
0.1	49.91	47.34	32.44	44.45
0.2	52.24	51.63	40.53	47.4
0.3	60.57	57.66	57.67	52.5

Figure 1: Antioxidant Activity ofAntiaris toxicariaand Antiaris toxicaria a) DPPH radical activity of EM-F
b) DPPH radical activity of Antiaris toxicaria

Anti-inflammatory Activity: BothAntiaris toxicariaand Antiaris toxicaria exhibited significant anti-inflammatory effects, with the ethanol extract showing the highest inhibition of protein denaturation (78.47% forAntiaris toxicariaand 85.18% for Antiaris toxicaria). In contrast, chloroform and ethyl acetate extracts showed lesser activity.

Table 4: Anti-inflammatory Activity ofAntiaris toxicaria(Flowers) Extract

2.

Extract Type	Dose (mg/kg)	Inhibition (%)
Control	5 ml/kg	-
Standard (Ibuprofen)	100 mg/kg	90.32
Petroleum Ether	200 mg/kg	57.4
Chloroform	200 mg/kg	56.25
Ethyl Acetate	200 mg/kg	43.26
n-Butanol	200 mg/kg	54.37
Ethanol	200 mg/kg	78.47

3.

Table 5: Anti-inflammatory Activity of Antiaris toxicaria (Fruits) Extract

4.

Extract Type	Dose (mg/kg)	Inhibition (%)
Control	5 ml/kg	-
Standard (Ibuprofen)	100 mg/kg	90.32
Petroleum Ether	200 mg/kg	68.19
Chloroform	200 mg/kg	24.2
Ethyl Acetate	200 mg/kg	54.18
n-Butanol	200 mg/kg	67.71
Ethanol	200 mg/kg	85.18

5.

Figure 2: Anti-inflammatory Activity ofAntiaris toxicariaand Antiaris toxicaria

6.

Conclusion: This study demonstrates that both the flowers and fruits of *Antiaris toxicaria* possess substantial antioxidant and anti-inflammatory properties, likely due to the presence of various phytochemicals. The ethanol extracts showed the highest biological activity, validating the traditional medicinal uses of the plant. These findings provide support for the conservation and sustainable use of *Antiaris toxicaria*, and further studies are warranted to explore its therapeutic potential in clinical settings.

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